

REVIEW OF THE GENUS *OSBORNELLUS* BALL (HEMIPTERA: CICADELLIDAE: DELTOCEPHALINAE) FROM HISPANIOLA, INCLUDING FIFTEEN NEW SPECIES¹

Paul H. Freytag²

ABSTRACT: The genus *Osbornellus* is reviewed for Hispaniola. Seventeen species are now known from this island, two described species, *bimarginatus* (DeLong) and *fasciatus* Metcalf, and fifteen new species from the Dominican Republic. The new species are: *dipilus*, *bellus*, *coloritubus*, *brevitubus*, *tubus*, *eccritus*, *dicellus*, *proximus*, *arcus*, *venustus*, *hispanus*, *sagarus*, *parvus*, *eratus*, and *tetrus*. A key to all species is included.

KEY WORDS: Hemiptera, Cicadellidae, Deltocephalinae, *Osbornellus*, Hispaniola

The genus *Osbornellus* has been poorly known for the Caribbean Region. Linnavuori (1959) reviewed this genus placing the species from this region in the subgenus *Nereius*, and included 5 species. None of the five species described at that time were known from Hispaniola. Since that time two of the species have now been found on the Island, *bimarginatus* (DeLong, 1923) described from Puerto Rico, and *fasciatus* Metcalf (1954) described from the Bahama Islands. Also, 15 new species have now been found in the Dominican Republic and are described in this paper. A key to all 17 species is given below.

All species found on Hispaniola belong to the subgenus *Nereius* Linnavuori (1956). This subgenus is separated from other members of the genus by the male styles being hook-like, and the head usually with anterior transverse bands. This subgenus is only known from the Caribbean Region.

Most specimens used in this study were collected into alcohol, so the colors, especially the reds and reddish oranges, have disappeared. Where they are usually retained and not missing this character is used in the following key. Otherwise, the male genitalia appear to be more reliable for identification of species. Additional species could be found as females are known which have a color pattern different from the ones covered here.

The acronyms used in this paper are: CMNH= Carnegie Museum of Natural History, Pittsburg, PA; FSCA= Florida State Collection of Arthropods, Gainesville, FL.; UKYL= University of Kentucky Insect Collection, Lexington, KY; MHND= Museo Nacional de Historia Natural, Santo Domingo, Dominican Republic.

SYSTEMATIC ENTOMOLOGY

Key to the Hispaniola species of *Osbornellus*

- | | | |
|----|--|-----------------------|
| 1. | Transverse bands on anterior of head present (Figs. 2-8) | 2 |
| 1' | Transverse bands on anterior of head absent (Fig. 1)..... | <i>dipilus</i> n. sp. |
| 2. | Aedeagus tubular, usually without processes (Fig. 13) | 3 |
| 2' | Aedeagus with a pair of prominent processes (Fig. 32) | 6 |

¹ Received on February 13, 2007. Accepted on May 20, 2007.

² Department of Entomology, University of Kentucky, Lexington, Kentucky 40546 U.S.A. E-mail: freytag2104@windstream.net.

3. Overall color straw-colored to brown.....4
 3' Head, pronotum and forewings with reddish markings5
4. Male light brown, less than 4.5 mm. Aedeagus small (Fig. 13)..*brevitubus* n. sp.
 4' Male dark brown, more than 5.0 mm. Aedeagus large (Fig. 15).....*tubus* n. sp.
5. Aedeagus C-shaped, short (Fig. 17); red dashes on pronotum long (Fig. 2)
*bellus* n. sp.
 5' Aedeagus longer, similar to *brevitubus* (Fig. 13); red dashes on pronotum short,
 near anterior margin.....*coloritubus* n. sp.
6. Overall length greater than 6.0 mm.....*eccritus* n. sp.
 6' Overall length less than 5.5 mm7
7. Aedeagus with processes separate to base, spine-like, longer than shaft (Figs. 23)
*dicellus* n. sp.
 7' Aedeagus with processes from middle of shaft, or subbasally, usually blade-like
 (Fig. 32).....8
8. Aedeagus with processes closely pressed to shaft (Fig. 26).....*proximus* n. sp.
 8' Aedeagus with processes not closely pressed to shaft (Fig. 32)9
9. Pronotum with a median arch of red or orange red (Fig. 4).....*arcus* n. sp.
 9' Pronotum with a different color pattern, or no reddish markings10
10. Aedeagus with processes nearly same length as shaft (Fig. 32)11
 10' Aedeagus with processes distinctly longer than shaft (Fig. 44).....12
11. Aedeagus with processes converging at apex, in ventral view (Fig. 33)
*bimarginatus* (DeLong)
 11' Aedeagus with processes diverging at apex, in ventral view (Fig. 36).....
*fasciatus* Metcalf
12. Aedeagus with processes diverging at apex, in ventral view (Fig. 39).....13
 12' Aedeagus with processes parallel, or nearly so, in ventral view (Fig. 45)14
13. Pygofer short, rounded; subgenital plate as long as pygofer (Fig. 37)
*venustus* n. sp.
 13' Pygofer long, pointed at apex; subgenital plate shorter than pygofer (Fig. 40)....
*hispanus* n. sp.
14. Aedeagus with processes sinuate, in lateral view (Fig. 44)15
 14' Aedeagus with processes not sinuate, in lateral view (Fig. 50)16
15. Pygofer extending dorsad apically (Fig. 43); aedeagal processes extending
 beyond apex of subgenital plates (Fig. 45)*sagarus* n. sp.

- 15' Pygofer oval (Fig. 46); aedeagal processes same length as subgenital plates (Fig. 48).....*parvus* n. sp.
16. Aedeagus with processes curving dorsad, parallel to shaft, and nearly same length as subgenital plates (Fig. 50)*eratus* n. sp.
- 16' Aedeagus with processes straight, not parallel to shaft, and extending beyond apex of subgenital plates (Fig. 53).....*tetrus* n. sp.

***Osbornellus (Nereius) dipilus* Freytag, NEW SPECIES**

(Figures 1, 9-11, and 55)

Description: Length of males 3.8 mm., females 4-4.2 mm. Similar to *bimarginatus*, except without the transverse bands on anterior part of head. Head (Fig. 1) nearly same width as pronotum, crown with median length same as width between eyes. Color generally yellow brown. Head with posterior two-thirds darker brown. Pronotum and scutellum yellow brown with speckles of darker brown. Forewings mostly transparent yellow brown, with darker brown spots at apex of claval veins, claval suture and two veins reaching costal margin, costal cells with median dash of darker brown. Male genitalia: Pygofer (Fig. 9) narrowing to nearly pointed apex. Subgenital plates (Figs. 9 and 11) narrow, nearly as long as pygofer. Style (Fig. 11) short, bluntly hooked. Connective (Fig. 11) Y-shaped. Aedeagus (Fig. 11) shorter than subgenital plates, shaft bluntly rounded at apex, with a pair of subapical hairlike processes, divergent at apex. Female seventh sternum (Fig. 55) short, with posterior margin narrowing to bluntly pointed median.

Type Data: Holotype male: Dominican Republic, Pedernales, Cabo Rojo, Alcoa Headquarters, 20-24-VI-1999, blacklight trap, R. E. Woodruff and R. Baranowski (FSCA).

Additional Specimens: One female, Pedernales, 23 km N Cabo Rojo, 18-06N 71-38W, 540 m., 13-19-VII-1990, L. Masner, J. Rawlins, C. Young, deciduous forest, intercept trap (CMNH); one female, Pedernales, 21 km N Cabo Rojo, 1-2-VII-1998, blacklight trap, R. E. Woodruff and R. Baranowski (FSCA); one female, Pedernales, 24 km N Cabo Rojo, 23-VI-1999, blacklight trap, R. E. Woodruff and R. Baranowski (FSCA).

Remarks: This species can be separated from the other species by the lack of the anterior bands on the crown, and the male styles being bluntly hooked at apex. This species is named for the two small hairlike processes on the male aedeagus.

***Osbornellus (Nereius) bellus* Freytag, NEW SPECIES**

(Figures 2, 16-18, and 56)

Description: Length of male 4.8-5 mm., female 5.2-5.7 mm. Similar to *bimarginatus*, but with red bands and quite different male genitalia. Head (Fig. 2) nearly same width as pronotum, median length slightly shorter than width between eyes. Pronotum with anterior margin acute. Color generally yellow brown. Head with two black transverse bands above ocelli on crown, two below ocelli on face, with red band behind anterior bands on crown. Pronotum (Fig. 2) with a pair of longitudinal bands of red, one each side of median. Male genitalia: Pygofer (Fig. 16) with rounded apex. Subgenital plates (Figs. 16 and 18) wide at base, narrowing to thin long apex. Style

(Fig. 18) short, with sharply pointed hook-like apex. Connective (Fig. 18) short, Y-shaped. Aedeagus (Fig. 17) short, finger-like, without processes. Female seventh sternum (Fig. 56) short, posterior margin rounded, with a spot of dark pigment medially.

Type Data: Holotype male: Dominican Republic, Barahona, Eastern Sierra Bahoruco, Reserva Cachote, 12.8 km NE Paraiso, 18-05-58N 71-11-26W, 1219 m., 22-23-XI-2004, J. Rawlins, C. W. Young, V. Verdecia, C. Nunez, disturbed cloud forest on road, UV light, sample 44115 (CMNH). Paratypes: Three males, same data as holotype (one each, CMNH, FSCA, UKYL).

Additional Specimens: Dominican Republic, Barahona, four males, 1 female, same data as holotype, except 18-05-52N 71-11-19W, 1198 m., 21-23-III-2004, J. Rawlins, C. Young, R. Davidson, C. Nunez, M. Rial, semi-disturbed wet broadleaf, UV light, sample 44313 (CMNH); three males, three females, same data, except 18-05-54N 71-11-21W, 1230 m., cloud forest with tree ferns, sample 44213 (CMNH); one female, same data, except yellow pan trap, sample 44263 (CMNH); six males, 4 females, same data, except 18-05-58N 71-11-26W, 1219 m., disturbed cloud forest on road, sample 44113 (CMNH); one male, two females, same data, except 18-05-52N 71-11-19W, 1198 m., 22-23-XI-2004, J. Rawlins, V. Verdecia, C. Young, C. Nunez, W. Zanol, semi-disturbed wet broadleaf, UV light, sample 44315 (CMNH); twenty males, eight females, same data, except 18-05-58N 71-11-26W, 1219 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, disturbed cloud forest on road, UV light, sample 44114 (eighteen males, six females CMNH, two males, two females UKYL); three males, two females, same data, except 18-05-54N 71-11-21W, 1230 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, cloud forest with tree ferns, UV light, sample 44214 (CMNH); seven males, five females, same data, except 18-05-52N 71-11-19W, 1198 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, semi-disturbed wet broadleaf, UV light, sample 44314 (CMNH); one female, same data, except 18-05-58N 71-11-26W, 1219 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, disturbed cloud forest on road, canopy trap, sample 44194 (CMNH); one female, same data, except 18-05-52N 71-11-19W, 1198 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, semi-disturbed wet broadleaf, canopy trap, sample 44394 (CMNH); and two males, Independencia, Sierra de Bahoruco, north slope, 13.5 km SE Puerto Escondido, 18-12-24N 71-30-54W, 1807 m., 24-26-III-2004, R. Davidson, J. Rawlins, C. Young, C. Nunez, M. Rial, broadleaf *Pinus* dense woodland, UV light, sample 41213 (CMNH).

Remarks: This species has only been found in this one area on the island. The color pattern and male genitalia are quite distinct and will identify this species from all others. It is named for the beautiful color pattern.

Osbornellus (Nereius) brevitubus Freytag, NEW SPECIES

(Figures 3, 12-14, and 57)

Description: Length of male 4-4.6 mm., female 4.5-5.2 mm. Similar to *bimarginatus* but smaller, darker, with quite different male genitalia. Color generally yellow brown with darker brown cross veins along costal margin and apical veins. Head with two black transverse bands above ocelli on crown, two bands below ocelli on face. Male genitalia: Pygofer (Fig. 12) small, nearly truncate. Subgenital plate (Figs.

12 and 14) triangular, but elongate. Aedeagus (Fig. 13) C-shaped, about half length of subgenital plates. Style (Fig. 14) small, with thin, sharply pointed apex. Connective (Fig. 14) short, Y-shaped. Female seventh sternum (Fig. 57) nearly rounded on posterior margin, with dark spot in middle.

Type Data: Holotype male: Dominican Republic, Barahona, Filipinas, Larimar Mine, 1006 m., 12-IV-1997, blacklight trap, R. E. Woodruff (FSCA). Paratypes: 15 males, 24 females, same data as holotype (two males, two females CMNH; two males, two females UKYL; eleven males, twenty females FSCA).

Additional Specimens: One male, five females, Dominican Republic, Barahona, Filipinas, Larimar Mine, at light, 16-17-XII-1995, 1006 m., R. E. Woodruff (FSCA); one male, Barahona, 5 km SE Palo, slopes of Loma La Torre, 18-03N 71-16W, 980 m., 18-VII-1992, disturbed forest with coffee, C. Young, R. Davidson, S. Thompson, J. Rawlins (CMNH); one female, Barahona, 4 km NE Polo, 1260 m., 9-VII-1987, R. Davidson, J. Rawlins (CMNH); one female, Baoruco, Sierra de Neiba, Los Guineos on upper Rio Colorado, 18-35N 71-11W, 630 m., 11-12-VIII-1990, J. Rawlins, S. Thompson, Mesic riparian woodland (CMNH); one female, Monseñor Nouel, 25.6 km ESE Maimon, 18-49-30N 70-03-13W, 110 m., 20-XI-2002, W. A. Zanol, C. W. Young, C. Slaresinic, J. Rawlins, disturbed forest along stream, hand collected, sample 50649 (CMNH); one female, Hato Mayor, Parque los Haitises, near Cueva de Arena, 19-04N 69-28W, 10 m., 7-9-VII-1992, C. Young, R. Davidson, S. Thompson, J. Rawlins, costal vegetation on limestone (CMNH); one female, Pedernales, 26 km N Cabo Rojo, 760m., 17-VII-1987, J. Rawlins, R. Davidson (CMNH); one male, one female, Pedernales, La Abeja, 38 km NNW Cabo Rojo, 18-09N 71-38W, 1160 m., 13-VII-1987, J. Rawlins, R. Davidson (CMNH); three males, eleven females, Pedernales, 23.5 km N Cabo Rojo, 18-06N 71-38W, 540 m., 13-19-VII-1990, L. Masner, J. Rawlins, C. Young, Deciduous forest, intercept trap (CMNH); three males, three females, same data, except 20-VII-1990, C. W. Young, J. E. Rawlins, S. Thompson (CMNH); four males, six females, same data, except 26 km N Cabo Rojo, 730 m., 20-VII-1990, C. W. Young, J. E. Rawlins, S. Thompson (CMNH); four males, one female, same data, except 30 km N Cabo Rojo, 18-07N 71-39W, 1070 m., 23-24-VII-1990, C. Young, J. E. Rawlins, S. Thompson (CMNH); one female, one without abdomen, same data, except 23.5 km N Cabo Rojo, 18-06N 71-38W, 540 m., 13-25-VII-1990, C. Masner, J. Rawlins, C. Young, Deciduous Forest, intercept trap (CMNH); one male, one female, same data, except 26 km N Cabo Rojo, 18-06N 71-38W, 730 m., 19-25-VII-1990, L. Masner, J. Rawlins, C. Young, wet deciduous forest, intercept trap or sweep sample (CMNH); one female, same data, except, 30 km N Cabo Rojo, 18-07N 71-39W, 1070 m., 27-IX-1991, R. Davidson, C. Young, S. Thompson, J. Rawlins, Reservoir, pine woods (CMNH); one male, same data, except, Sierra de Baoruco, Aceitillar, 25.2 km ENE Pedernales, 18-05-29N 71-31-16W, 1272 m., 14-VI-2003, C. Young, J. Rawlins, C. Nunez, R. Davidson, P. Acevedo, M. de la Cruz, dense broadleaf forest, pine, hand sampled 42242 (CMNH); one male, Pedernales, 24 km N Cabo Rojo, 2-VI-1998, beating at night, R. E. Woodruff (FSCA); one male, same data, except 23-VI-1998, blacklight, R. E. Woodruff and R. Baranowski (FSCA); one male, one female, same data, except 21 km N. Cabo Rojo, 1-2-VII-1998, blacklight trap, R. E. Woodruff and R. Baranowski

(FSCA); one female, same data, except 24 km N Cabo Rojo, 10-VI-1998, P. H. Freytag, B. K. Dozier and R. E. Woodruff (UKYL); and one male, seven females, same data as last except, 11-VI-1998 (UKYL).

Remarks: This is a very common species on the island. It can be recognized by the smaller size and uniform brown color, with the smaller tubular aedeagus in the male. It is named for the smaller tubular aedeagus.

***Osbornellus (Nereius) tubus* Freytag, NEW SPECIES**

(Figures 15 and 58)

Description: Length of male 5.4-5.7 mm., female 5.9-6.0 mm. Similar to *brevitubus* but larger and somewhat darker in color. Overall color darker yellowish brown, with brown veins and apical veins. Head with two transverse bands above ocelli on crown, and two bands below ocelli on face. Male genitalia: Pygofer similar to *brevitubus* but larger. Subgenital plates triangular, elongate. Aedeagus (Fig. 15) tubular, larger, longer than *brevitubus*. Style and connective similar to *brevitubus*. Female seventh sternum (Fig. 58) with posterior margin almost evenly rounded.

Type Data: Holotype male: Dominican Republic, Barahona, Eastern Sierra Bahoruco, Reserva Cachote, 12.8 km NE Paraiso, 18-05-52N 71-11-19W, 1198 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, semi-disturbed wet broadleaf, UV light, sample 44314 (CMNH). Paratype female: Same data as holotype (CMNH).

Additional Specimens: Dominican Republic, one female, same data as holotype, except 18-05-54N 71-11-21W, 1230m., 22-23-XI-2004, J. Rawlins, C. Young, V. Verdecia, C. Nunez, W. Zanol, cloud forest with tree ferns, sample 44215 (CMNH); two male, same data, except 21-23-III-2004, J. Rawlins, C. Young, R. Davidson, C. Nunez, M. Rial, sample 44213 (CMNH); one male, same data, except 18-05-52N 71-11-19W, 1198 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, semi-disturbed wet broadleaf, malaise trap, sample 44384 (CMNH); two males, same data, except 18-05-58N 71-11-26W, 1219 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, disturbed cloud forest on road, UV light, sample 44114 (CMNH); two males, same data, except 18-05-54N 71-11-21W, 1230 m., 19-21-V-2004, C. Young, C. Nunez, J. Rawlins, J. Fetzner, cloud forest with tree ferns, sample 44214 (CMNH); one male, one female, La Vega, Cordillera Central, 4.1 km SW El Couvento, 18-50-37N 7-42-48W, 1730 m., 31-V-2003, J. Rawlins, R. Davidson, C. Young, C. Nunez, P. Acevedo, dense secondary evergreen forest with pine, UV light, sample 22212 (CMNH); one female, same data, except 18-50-33N 70-42-44W, 1729 m., sample 22312 (CMNH); one female, Elías Piña, Sierra de Neiba, 9.0 km WSW Hondo Valle, 18-41-34N 71-46-52W, 1843 m., 25-VI-2003, J. Rawlins, C. Young, R. Davidson, C. Nunez, P. Alevedo, M. de la Cruz, disturbed montane woodland with pine, UV light, sample 31312 (CMNH); and three females, same data, except 18-41-31N 71-47-03W, 1901 m., montane forest with *Podocarpus*, sample 31112 (CMNH).

Remarks: This species is larger than *brevitubus* and somewhat darker brown. The male aedeagus is larger also. It is named for the large tubular aedeagus.

***Osbornellus (Nereius) coloritubus* Freytag, NEW SPECIES**

Description: Length of male 4.2 mm., female unknown. Similar to *bellus* in color pattern, but with male genitalia closer to *brevitubus*. Head with two transverse bands on crown behind ocelli, one band below ocelli on face, behind bands on crown mostly red. Pronotum with pair of red marks, one on each side of median on anterior margin. Scutellum with a red patch on each side. Forewings mostly yellow brown with brown veins. Male genitalia: Similar to *brevitubus*, except aedeagus tubular with small closely appressed processes near middle of shaft.

Type Data: Holotype male: Dominican Republic, Duarte, Reserva Loma Quita Espuela El Cadillar, 6.7 km NE San Francisco de Macoris, 19-20-12N 70-08-59W, 280 m., 5-V-2004, R. Davidson, J. Rawlins, C. Young, weedy regrowth with coffee, cacao, UV light, sample 50313 (CMNH).

Remarks: This species looks similar to *bellus* except smaller, and the red bands on the pronotum are much shorter and the male aedeagus is longer and with nearly hidden processes on the shaft. Many females are on hand that could be this species but the color patterns are somewhat different, and the specimens are larger, and from different areas, and therefore not included at this time.

***Osbornellus (Nereius) eccritus* Freytag, NEW SPECIES**

(Figures 5, 19-21, and 61)

Description: Length of male 6-6.2 mm., female 6.5-6.6 mm. Similar to *bimarginatus*, but larger, with two transverse bands above ocelli on crown, one band below ocelli on face. Generally yellow brown with few darker brown markings. Male genitalia: Pygofer (Fig. 19) large, nearly truncate at apex. Subgenital plate (Figs. 19 and 21) triangular, elongate. Aedeagus (Figs. 20 and 21) stout, shaft bent dorsad at apex, with pair of processes from middle of shaft, extending beyond shaft, thickened in ventral view and deviating at apex. Style (Fig. 21) stout, bluntly pointed at apex. Connective (Fig. 21) Y-shaped. Female seventh sternum (Fig. 61) with posterior margin roundedly extended in median.

Type Data: Holotype male: Dominican Republic, La Vega, Loma del Casabito, 19-03N 70-31W, 1390 m., 3-XI-2002, W. A. Zanol, C. W. Young, C. Staresinic, J. Rawlins, wet cloud forest, UV light, sample 24119 (CMNH). Paratypes: Three males, 2 females, same data as holotype (one male, one female CMNH; one male FSCA; one male UKYL).

Additional Specimens: Dominican Republic: One male, La Vega, 15 km E. El Rio, 26-V-1978, C. W. and L. B. O'Brien and Marshall (FSCA); one female, same data, except 19 km E El Rio, 3-VIII-1979, L. B. O'Brien (FSCA); one female, same data, except 24 km E El Rio (UKYL); one female, same data, except 18 km E El Rio, 4-VIII-1979, G. B. Marshal (UKYL); three females, same data, except 10-VIII-1979, crest, cloud forest (UKYL); one male, La Vega, 53 km SE Constanza, 9-VIII-1979, C. W. O'Brien (UKYL); one female, same data, except L. B. O'brien; one male, La Vega, Cordillera Central, Loma Casabito, 16.0 km NW Bonao, 19-02-21N 70-31-05W, 1487 m., 28-V-2003, J. Rawlins, C. Young, R. Davidson, C. Nunez, P. Acevedo, evergreen cloud forest at summit, Malaise trap, sample 21182 (CMNH); one male,

one female, same data, except 15.8 km NW Bonao, 19-02-12N 70-31-08W, 1455 m., east slope, UV light, sample 21212 (CMNH); two females, same data, except yellow pan trap, sample 21262 (CMNH); four males, Duarte, Reserva Loma Quita Espuela Cauelo, 13.2 km NNE San Francisco de Macoris, 19-24-46N 70-09-52W, 515 m., 6-IV-2004, C. Young, R. Davidson, J. Rawlins, edge of wet broadleaf forest, UV light, sample 11213 (three males CMNH, one male UKYL); and one male, same data, except canopy trap, sample 11293 (CMNH).

Remarks: This is one of the largest species of this genus on Hispaniola. It is easily separated from the others by size, color and male genitalia. It is named for the fact that it is fairly easy to separate from the other known species.

Osbornellus (Nereius) dicellus Freytag, NEW SPECIES

(Figures 22-24)

Description: Length of male 4.6 mm., female unknown. Overall looks similar to *bimarginatus*, except with quite different male genitalia. Male genitalia: Pygofer (Fig. 22) long with narrowed rounded apex. Subgenital plate (Figs. 22 and 24) long, triangular. Aedeagus (Fig. 23) with shaft short, pair of long processes from base extending at least half their length beyond shaft. Style (Fig. 24) normal, with sharply hooked apex. Connective (Fig. 24) Y-shaped.

Type Data: Holotype male: Dominican Republic, La Altagracia, Nisibon, 3-V-1978, blacklight, R. E. Woodruff and G. B. Fairchild (FSCA).

Remark: This species is separated from *bimarginatus* by the quite different male aedeagus. It is named for the long tine-like processes of the aedeagus.

Osbornellus (Nereius) proximus Freytag, NEW SPECIES

(Figures 25-27)

Description: Length of male 4.4-5.2 mm., female 5 mm. Similar to *bimarginatus* in overall looks. Forewing with a cross vein between second claval vein and claval suture. Color overall yellow brown with few markings. Head with area between transverse bands, yellow. Forewings transparent yellow brown with dark brown patch over apical vein and two cross veins reaching costal margin. Male genitalia: Pygofer (Fig. 25) elongate, with rounded apex. Subgenital plate (Figs. 25 and 27) triangular, elongate, same length as pygofer. Aedeagus (Fig. 26) U-shaped, tubular, with pair of processes closely appressed to and same length as shaft. Style (Fig. 27) normally hooked, sharply pointed. Connective (Fig. 27) Y-shaped. Female seventh sternum similar to *tubus*, with posterior margin evenly rounded.

Type Data: Holotype male: Dominican Republic, Independencia, Sierra de Neiba, south slope near summit, 40 km N Angel Felex, 18-40-21N 71-46-05W, 1825 m., 1-2-IV-2004, J. Rawlins, C. Young, R. Davidson, broadleaf cloud forest without pine, UV light, sample 34213 (CMNH). Paratypes: Three males, same data as holotype (one each CMNH, FSCA, UKYL).

Additional Specimens: One male, Dominican Republic, Pedernales, 30 km N Cabo Rojo, 18-07N 71-37W, 1070 m., 31-VII-1990, C. W. Young, J. E. Rawlins, S. Thompson; one male, same data, except 71-39W, 23-24-VII-1990 (CMNH); two

males, Duarte, Reserva Loma Quita Espuela, Canelo, 13.2 km NNE San Francisco de Macoris, 19-24-46N 70-09-52W, 515 m., 6-IV-2004, C. Young, R. Davidson, J. Rawlins, edge of wet broadleaf forest, UV light, sample 11213 (CMNH); two males and four females, same as last except, El Cadillar, 6.7 km NE San Francisco de Macoris, 19-20-12N 70-08-59W, 280 m., 5-IV-2004, weedy regrowth with coffee, cacao, sample 50313 (one male and three females CMNH, one male and one female UKYL); one male, same data, except hand collected, sample 50343 (CMNH); two males and 2 females, Azua, East side of crest, Sierra Martin Garcia, 7 km WNW Barrero, 18-21N 70-58W, 860 m., 25-26-VII-1992, C. Young, R. Davidson, S. Thompson, J. Rawlins, cloud forest adjacent to disturbed forest. (one male and one female CMNH, one male and one female UKYL).

Remarks: This species is separated from the other species by the male having the aedeagus with the very closely appressed processes. This species is named for these closely appressed processes.

***Osbornellus (Nereius) arcus* Freytag, NEW SPECIES**

(Figures 4, 28-30, and 60)

Description: Length of male 4.5-5.5 mm., female 4.8-6.0 mm. Head with anterior margin nearly foliate. Forewings with venation nearly reticulate and 4-6 cross veins along costal margin. Generally yellow brown with markings of red and dark brown. Head (Fig. 4) yellow brown with one transverse band above and one below anterior margin; anterior margin between bands, yellow; crown also with red transverse band across middle. Pronotum (Fig. 4) yellow brown with transverse red arch just behind middle. Scutellum (Fig. 4) yellow brown with slight orange patch in median area. Forewings yellow brown with claval veins reticulate, red; corium with basal veins red changing to yellow brown near middle and outlined with dark brown. Male genitalia: Pygofer (Fig. 28) long with rounded apex. Subgenital plates (Figs. 28 and 30) triangular, nearly same length as pygofer. Aedeagus (Fig. 29) with shaft curving dorsad, blunt at apex, pair of processes coming off median of shaft, extending beyond apex of aedeagus, diverging at apex. Style (Fig. 30) with hooked, bluntly pointed apex. Connective (Fig. 30) Y-shaped. Female seventh sternum (Fig. 60) with posterior margin triangularly produced on median third.

Type Data: Holotype male: Dominican Republic, La Vega, 18 km E El Rio, 10-VIII-1979, crest, cloud forest, C. W. O'Brien (FSCA) Paratypes: One male, same data as holotype, except G. B. Marshall (CMNH); one male, same data as last, except 4-VIII-1979 (UKYL); one female, La Vega, 24 km SE Constanza, 4-VIII-1979, C. W. O'Brien (FSCA), one female, La Vega, La Nevera, Constanza, 16-VIII-1979, Marciano-Abud (MNHN).

Additional Specimens: Dominican Republic, 3 males, 2 females, La Vega, Cordillera Central, 4.1 km SW El Convento, 18-50-37N 70-42-48W, 1730 m., 31-V-2003, J. Rawlins, R. Davidson, C. Young, C. Nunez, P. Acevedo, dense secondary evergreen forest with pine, yellow pan trap, sample 22262 (two males, one female CMNH, one male, one female UKYL); one male, one female, La Vega, Cordillera Central, Loma Casabito, 15.8 km NW Bonao, 19-02-12N 70-31-08W, 1455 m., 28-V-2003, J. Rawlins, C. Young, R. Davidson, C. Nunez, P. Acevedo, evergreen cloud for-

est, east slope, yellow pan trap, sample 21262 (CMNH); one male, same data as last, except 16.0 km NW Bonao, 19-02-21N 70-31-05W, 1487 m., at summit, canopy trap, sample 21192 (CMNH); one male, La Vega, Cordillera Central, Reserva Valle Nuevo, La Nevera, 15.1 km SE Valle Nuevo, 18-41-47N 70-35-30W, 2252 m., 3-VI-2003, R. Davidson, C. Young, C. Nunez, J. Rawlins, P. Arevedo, M. de la Cruz, montane meadow in cloud forest, pine, yellow pan trap, sample 24462 (CMNH); one female, Elías Piña, Sierra de Neiba, 9.1 km WSW Hondo Valle, 18-41-38N 71-46-56W, 1856 m., 25-VI-2003, J. Rawlins, C. Young, R. Davidson, C. Nunez, P. Azevedo, M. de la Cruz, wet montane forest with pine, yellow pan trap, sample 31262 (CMNH); one male, one female, Independencia, Sierra de Neiba, south slope near summit, 4.0 km N Angel Feliz, 18-40-21N 71-46-05W, 1825 m., 1-2-IV-2004, J. Rawlins, C. Young, R. Davidson, broadleaf cloud forest without pine, yellow pan trap, sample 34263 (CMNH); two males, San Juan, Sierra de Neiba, 9.4 km SSW El Cercado, 18-39-18N 71-31-51W, 1975 m., 18-19-XI-2004, C. Young, J. Rawlins, C. Nunez, V. Verdecia, W. Zanol, meadow near mature pine forest, yellow pan trap, sample 32265 (CMNH); and one male, San Juan, Sierra de Neiba, Sabana del Silencio, 10.0 km SSW El Cercado, 18-39-07N 71-33-21W, 2009 m., 20-VI-2003, J. Rawlins, C. Nunez, R. Davidson, C. Young, P. Acevedo, M. de la Cruz, cloud forest along *Danthonia* savannah, yellow pan trap, sample 33262 (CMNH).

Remarks: This species is quite easily separated by its different body shape and color pattern. It is named for the arch of reddish orange on the pronotum.

Osbornellus (Nereius) bimarginatus (DeLong)
(Figures 6 and 31-33)

Scaphoideus bimarginatus DeLong 1923, p. 261.

Osbornellus bimarginatus Caldwell 1952, p. 51.

Osbornellus bimarginatus Linnavuori 1959, p. 218.

Redescription: Length of male 3.8-4.0 mm., female 4.0-4.7 mm. Head (Fig. 6) with two transverse bands on crown behind ocelli, and two bands on face below ocelli. Overall yellow brown with brown veins on forewings. Male genitalia: Pygofer (Fig. 31) elongate, with rounded apex. Subgenital plate (Figs. 31 and 33) triangular, with narrowed apical two-thirds. Aedeagus (Figs. 32 and 33) with shaft curving dorsad, pair of processes from median of shaft, extending just beyond apex of shaft, curving in ventral view (Fig. 33). Style (Fig. 33) short, with curving, sharply pointed apex. Connective (Fig. 33) short, Y-shaped. Female seventh sternum with posterior margin evenly convexly curved.

Specimens Studied: Dominican Republic, four males, Hato Mayor, Parque Los Haitises, near Cueva de Arena, 19-04N 69-28W, 10 m., 7-9-VII-1992, C. Young, R. Davidson, S. Thompson, J. Rawlins, costal vegetation on limestone (CMNH); fifteen males, La Altagracia, Parque del Este, 2.9 km SW Boca de Yuma, 18-21-51N 68-37-05W, 11 m., 28-V-2004, J. Rawlins, C. Young, C. Nunez, J. Fetzner, semihumid dry forest, limestone, UV light, sample 52114 (ten males CMNH, five males UKYL).

Remarks: This species appears to occur at lower elevations where little collecting has been conducted.

Osbornellus (Nereius) fasciatus Metcalf
(Figures 7, 34-36, and 59)

Osbornellus fasciatus Metcalf 1954, p. 31.

Osbornellus fasciatus Linnavuori 1959, p. 219.

Redescription: Length of male 4.3-4.5 mm., female 4.9-5.0 mm. Head (Fig. 7) with two black transverse bands above ocelli on crown, two bands below ocelli on face. Overall dark yellow brown, with brown veins on forewings. Male genitalia: Pygofer (Fig. 34) short, wide, with apex narrowly rounded. Subgenital plate (Figs. 34 and 36) triangular, elongate. Aedeagus (Fig. 35) with shaft curving dorsad, with pair of processes from median of shaft, extending just beyond shaft, flaring at apex in ventral view. Female seventh sternum (Fig. 59) with posterior margin truncate, with tab-like, darkly pigmented median.

Specimens Studied: Dominican Republic, one male, Pedernales, 21 km N Cabo Rojo, 1-2-VII-1998, blacklight trap, R. E. Woodruff and R. Baranowski (FSCA); one female, Pedernales, 23.5 km N Cabo Rojo, 18-06N 71-38W, 540m., 13-19-VII-1990, L. Mesner, J. Rawlins, C. Young, deciduous forest, intercept trap (CMNH); one male, one female, Azua, East side of crest, Sierra Martin Garcia, 7 km WNW Barrero, 18-21N 70-58W, 860 m., 25-26-VII-1992, C. Young, R. Davidson, S. Thompson, J. Rawlins, cloud forest adjacent to disturbed forest (CMNH); and one female, La Altagracia, Parque del Este, 2.9 km SW Boca de Yuma, 18-21-51N 68-37-05W, 11 m., 28-V-2004, J. Rawlins, C. Young, C. Nunez, J. Fetzner, semihumid dry forest, limestone, UV light, sample 52114 (CMNH).

Remarks: This species also occurs mostly at lower elevations. It is the only species at this time with the extra cross vein reaching the costal margin.

Osbornellus (Nereius) venustus Freytag, NEW SPECIES
(Figures 37-39)

Description: Length of male 3.9-4.1 mm., female unknown. Similar to *bimarginatus*, but with different male genitalia. Head with two black transverse bands on crown behind ocelli, and two bands below ocelli on face. Male genitalia: Pygofer (Fig. 37) truncate, nearly square. Subgenital plate (Figs. 37 and 39) triangular, elongate. Aedeagus (Fig. 38 and 39) with shaft curving dorsad, pair of processes from middle of shaft extending just beyond apex of shaft, diverging at apex in ventral view. Style (Fig. 39) with apex bluntly pointed. Connective (Fig. 39) Y-shaped.

Type Data: Holotype male: Dominican Republic, Pedernales, 24 km N Cabo Rojo, 11-VI-1998, blacklight trap, P. H. Freytag, B. K. Dozier and R. E. Woodruff (CMNH). Paratypes: One male, same data as holotype (UKYL); one male, same data, except 21 km N Cabo Rojo, 1-2-VII-1998, R. E. Woodruff and R. Baranowski (FSCA).

Remarks: This species has a rather truncate male pygofer, and aedeagus with the processes flaring at the apex. It is named for its overall charming looks.

Osbornellus (Nereius) hispanus Freytag, NEW SPECIES
(Figures 40-42)

Description: Length of male 4.0-4.2 mm., female unknown. Similar to *bimarginatus*, but with different male genitalia. Head with two black transverse bands on crown

behind ocelli, and two bands below ocelli on face. Male genitalia: Pygofer (Fig. 40) elongate, with apex narrowing, pointed. Subgenital plate (Figs. 40 and 42) triangular, elongate. Aedeagus (Figs. 41 and 42) similar to *venustus*, but more elongate, not greatly curved. Style (Fig. 42) elongate, thinner than in *venustus*. Connective (Fig. 42) Y-shaped.

Type Data: Holotype male: Dominican Republic, La Altagracia, Parque del Este, 2.9 km SW Boca de Yuma, 11 m., 18-21-51N 68-37-05W, 28-V-2004, J. Rawlins, C. Young, C. Nunez, J. Fetzner, semi-humid dry forest, limestone, UV light, sample 52114 (CMNH). Paratypes: Four males, same data as holotype (two males, CMNH; one male, FSCA; one male UKYL).

Remarks: This species is similar to *venustus*, but the male pygofer is more elongate and somewhat pointed at apex. It is named for its Spanish origin.

***Osbornellus (Nereius) sagarus* Freytag, NEW SPECIES**
(Figures 43-45)

Description: Length of males 4.5-4.9 mm., female 5.0 mm. Overall similar to *hispanus*, but larger. Head with two bands on anterior of crown behind ocelli, and two bands on face just below ocelli. Overall color yellow brown, with brown veins on forewings. Male genitalia: Pygofer (Fig. 43) large with narrow rounded apex. Subgenital plate (Figs. 43 and 45) triangular, long, broad at base in lateral view. Aedeagus (Fig. 44) with shaft curving dorsad, pair of processes from near base, stout, extending half their length beyond shaft, parallel (Fig. 45) in ventral view. Female seventh sternum with posterior margin evenly, convexly curved.

Type Data: Holotype male: Dominican Republic, Peravia, 13 km NW Bani, 8-VII-1979, C. W. O'Brien (FSCA). Paratypes: One female, same data as holotype (FSCA); one female, same data, except 12-VII-1979, L. B. O'Brien (UKYL); one male, Peravia, Cruce de Ocoa, Bani, 22-VIII-1979, Dquez-Mota (MHND).

Additional Specimens: One male, Dominican Republic, Pedernales, 15 km N Cabo Rojo, 21-VI-1998, blacklight, R. E. Woodruff and R. Baranowski (FSCA): two males La Altagracia, Parque del Este, Caseta Guaraguae, 4.4 km SE Baychibe, 18-19-59N 68-48-42W, 3 m., 26-27-V-2004, C. Young, J. Rawlins, J. Fetzner, C. Nunez, semihumid forest near sea, limestone, UV light, sample 51114 (CMNH).

Remarks: The three male specimens not in the type series are smaller than the holotype but have the same male genitalia. This species is similar to *hispanus*, but is larger in size and has different male genitalia which will separate the two species at this time. It is named for the sword-like processes on the male aedeagus.

***Osbornellus (Nereius) parvus* Freytag, NEW SPECIES**
(Figures 46-48)

Description: Length of male 4.3 mm., female unknown. Overall look similar to *bimarginatus*, but with quite different male genitalia. Male genitalia: Pygofer (Fig. 46) short, broadly rounded at apex. Subgenital plate (Figs. 46 and 48) long, triangular. Aedeagus (Figs. 47 and 48) with shaft tubular curving dorsad, pair of processes off middle of shaft, extending beyond shaft, slightly divergent at apex in ventral view. Style (Fig. 48) elongate, not greatly curved at apex. Connective (Fig. 48) Y-shaped.

Type Data: Holotype male: Dominican Republic, La Romana, 2 km N La Romana, 15-VI-1998, blacklight trap, P. H. Freytag, B. K. Dozier, and R. E. Woodruff (FSCA).

Remarks: The male aedeagus has processes that gradually flare to the apex. This species is named for its small size.

***Osbornellus (Nereius) eratus* Freytag, NEW SPECIES**
(Figures 49-51)

Description: Length of male 4.4 mm., female unknown. Overall appearance as in *bimarginatus*, with nearly transparent forewings, and different male genitalia. Male genitalia: Pygofer (Fig. 49) short, broadly rounded at apex. Subgenital plate (Figs. 49 and 51), triangular, elongate, narrowed near base. Aedeagus (Figs. 50 and 51) with shaft tubular curving dorsad, pair of processes from near middle of shaft, extending just beyond shaft, following curve of shaft, nearly parallel in ventral view. Style (Fig. 51) normal, with short sharply pointed apex. Connective (Fig. 51) Y-shaped.

Type Data: Holotype male: Dominican Republic, Pedernales, 24 km N Cabo Rojo, 2-VI-1998, beating at night, R. E. Woodruff (FSCA).

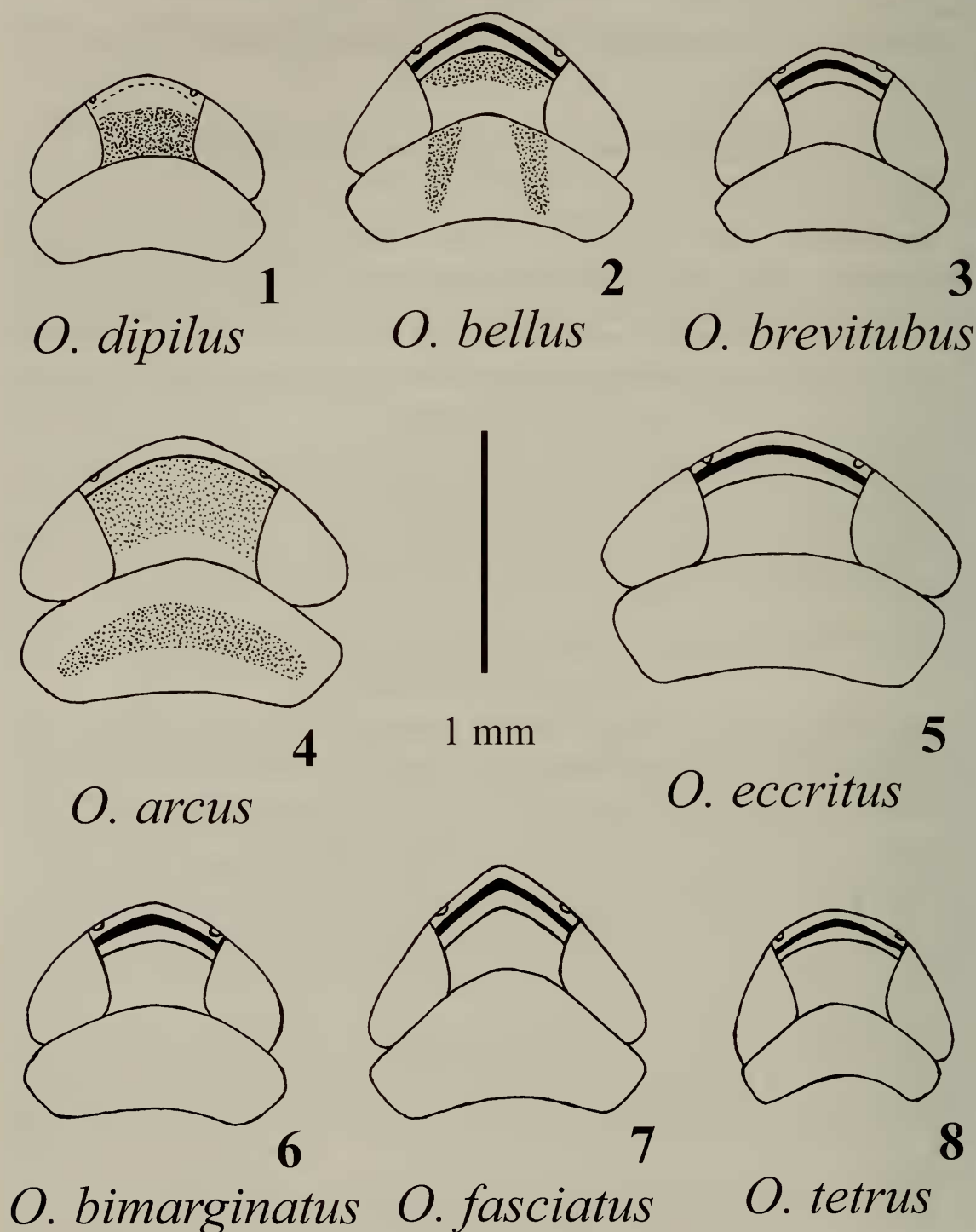
Remarks: The male aedeagus is quite different from the other species, and will identify this species. This species is named for its overall nice looks.

***Osbornellus (Nereius) tetrus* Freytag, NEW SPECIES**
(Figures 8 and 52-54)

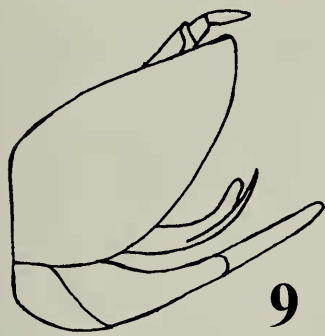
Description: Length of male 3.5 mm., females 3.5 mm. Similar to *bimarginatus*, but smaller and with different male genitalia. Head with two black transverse bands behind ocelli on crown, two bands below ocelli on face. Male genitalia: Pygofer (Fig. 52) small, nearly oval with rounded apex. Subgenital plate (Figs. 52 and 54) triangular, same length as pygofer, Aedeagus (Figs. 53 and 54) small, with shaft curving dorsad, pair of narrow, sharply pointed processes from beyond middle of shaft, extending beyond shaft, and nearly parallel in ventral view. Style (Fig. 54) short, bluntly pointed at apex. Connective (Fig. 54) Y-shaped. Female seventh sternum with posterior margin roundly produced.

Type Data: Holotype male: Dominican Republic, Pedernales, 15 km N Cabo Rojo, 21-VI-1998, blacklight, R. E. Woodruff and R. Baranowski (FSCA). Paratypes: one female, same data as holotype (FSCA); one female, Pedernales, 12 km N Cabo Rojo, 13-VI-1998, blacklight trap, P. H. Freytag, B. K. Dozier, and R. E. Woodruff (UKYL).

Remarks: The female paratype with the same data as the holotype is the only specimen seen with the color pattern in good condition. The other two specimens have little of the reddish orange color, as they were collected into alcohol. This species is however, very small, usually brightly colored, with a distinct male aedeagus, and is therefore easily separated from the other known species. This species is named for the four bands on the anterior part of the head.



Figures 1-8. Head and pronotum, dorsal view. Fig. 1. *Osbornellus (Nereius) dipilus* n. sp. Fig. 2. *O. (N.) bellus* n. sp. Fig. 3. *O. (N.) brevitubus* n. sp. Fig. 4. *O. (N.) arcus* n. sp. Fig. 5. *O. (N.) eccritus* n. sp. Fig. 6. *O. (N.) bimarginatus* (DeLong). Fig. 7. *O. (N.) fasciatus* Metcalf. Fig. 8. *O. (N.) tetrus* n. sp. All drawn to the same scale.



9

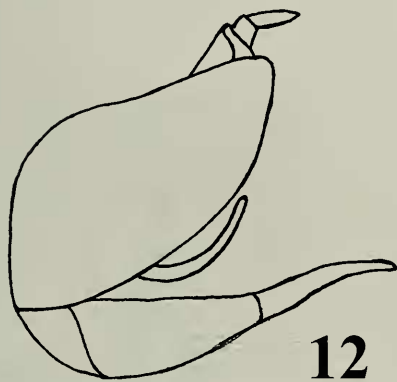
O. dipilus

10

0.5 mm



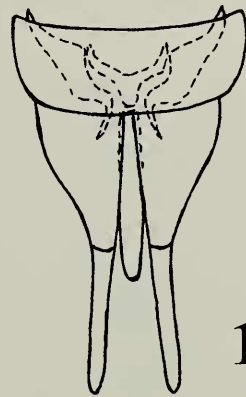
11



12

O. brevitubus

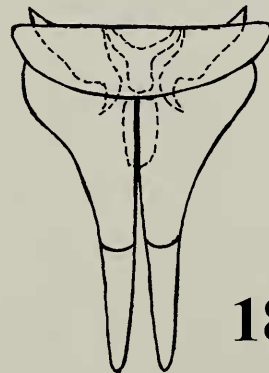
13



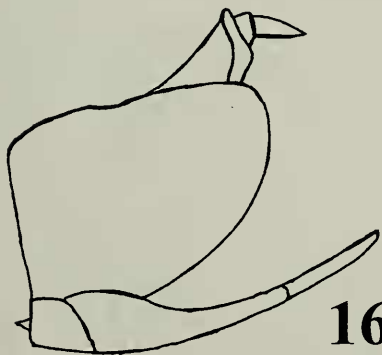
14



15

O. tubus

18

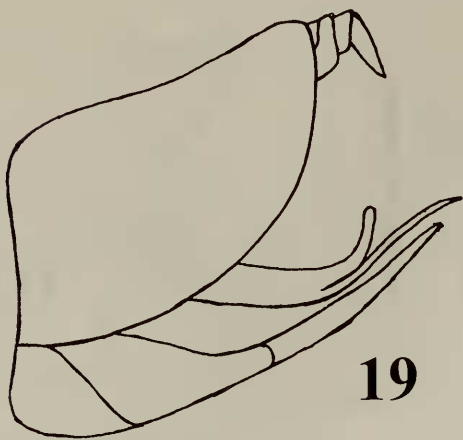


16

O. bellus

17

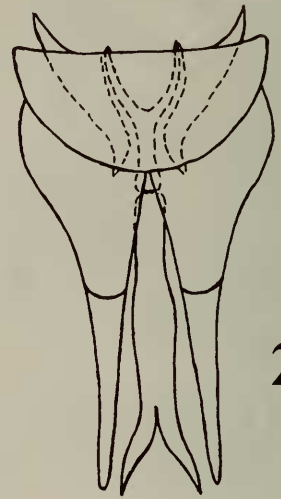
Figures 9-18. Male genitalia. Figs. 9-11 *Osbornellus (Nereius) dipilus* n. sp. Figs. 12-14. *O. (N.) brevitubus* n. sp. Figs. 15. *O. (N.) tubus* n. sp. Figs. 16-18. *O. (N.) bellus* n. sp. Figs. 9, 12, and 16, genital capsule, lateral view (setae not shown). Figs. 10, 13, 15, and 17, aedeagus, lateral view. Figs. 11, 14, and 18, valve and subgenital plates, ventral view (also showing internal genitalia). All drawn to the same scale.



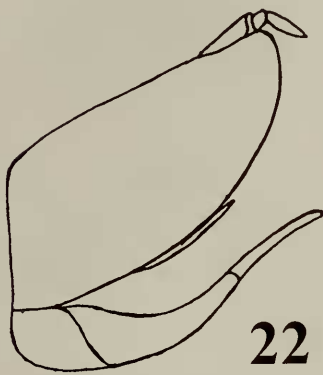
19



20



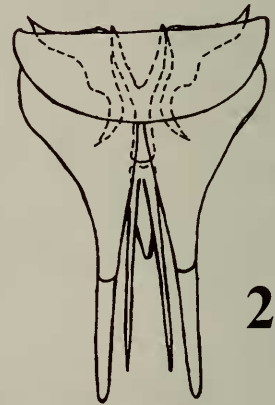
21

O. eccritus

22



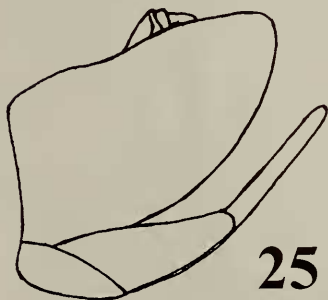
23



24

O. dicellus

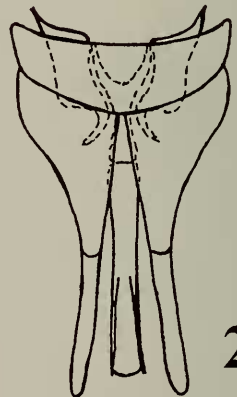
0.5 mm



25



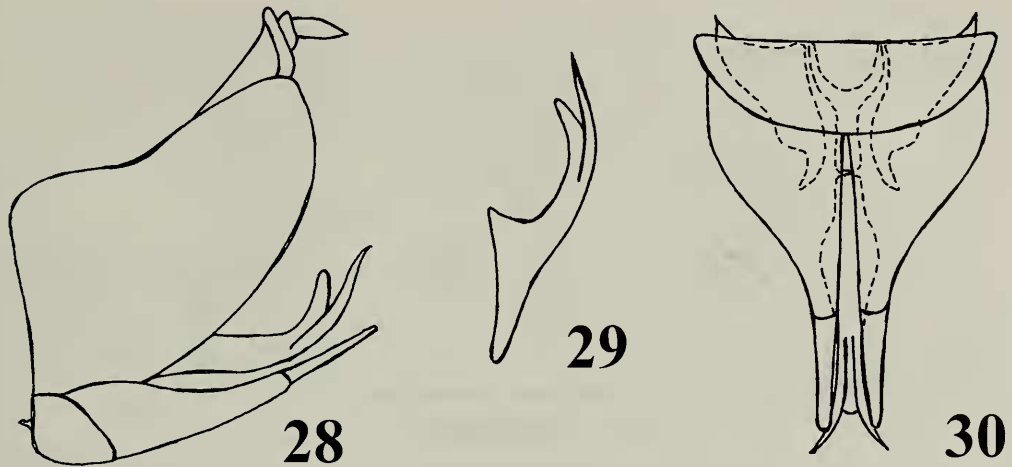
26



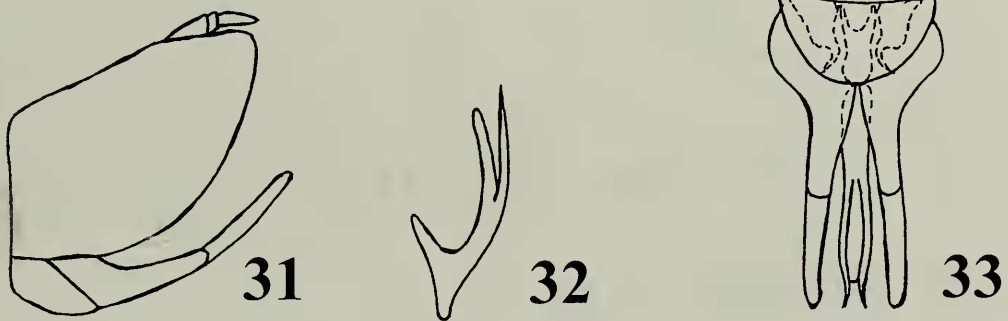
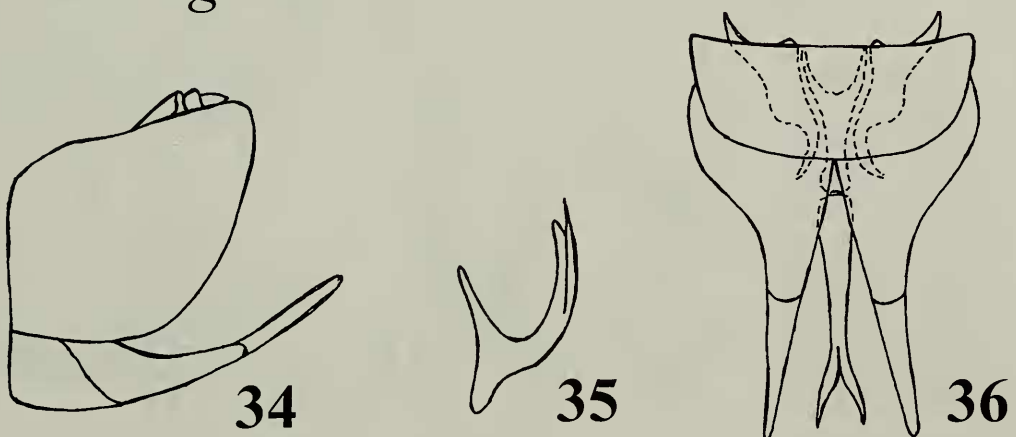
27

O. proximus

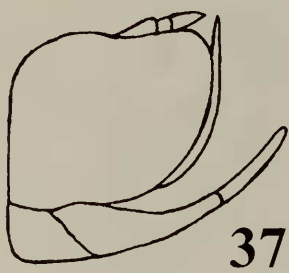
Figures 19-27. Male genitalia. Figs. 19-21. *Osbornellus (Nereius) eccritus* n. sp. Figs. 22-24. *O. (N.) dicellus* n. sp. Figs. 25-27. *O. (N.) proximus* n. sp. Figs. 19, 22, and 25, genital capsule, lateral view (setae not shown). Figs. 20, 23, and 26, aedeagus, lateral view. Figs. 21, 24, and 27, valve and subgenital plates, ventral view (also showing internal genitalia). All drawn to the same scale.

*O. arcus*

0.5 mm

*O. bimarginatus**O. fasciatus*

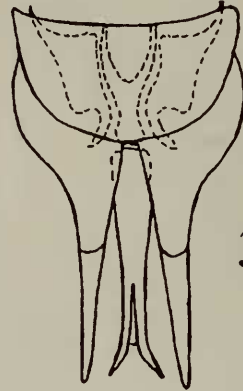
Figures 28-36. Male genitalia. Figs. 28-30. *Osbornellus (Nereius) arcus* n. sp. Figs. 31-33. *O. (N.) bimaculatus* (DeLong). Figs. 34-36. *O. (N.) fasciatus* Metcalf. Figs. 28, 31, and 34, genital capsule, lateral view (setae not shown). Figs. 29, 32, and 35, aedeagus, lateral view. Figs. 30, 33, and 36, valve and subgenital plates, ventral view (also showing internal genitalia). All drawn to the same scale.



37



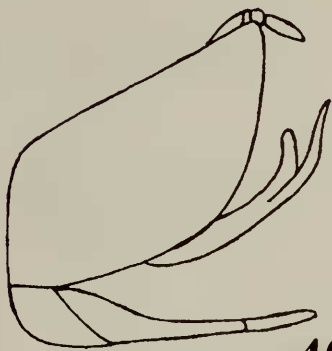
38



39

O. venustus

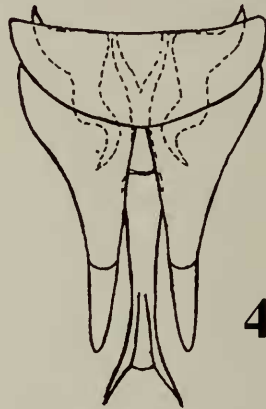
0.5 mm



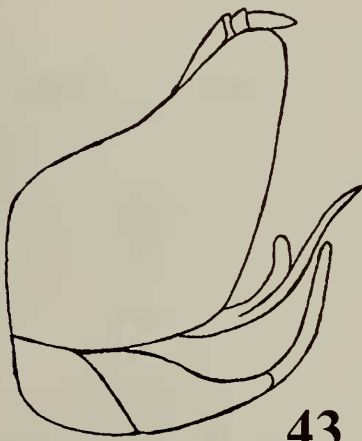
40



41



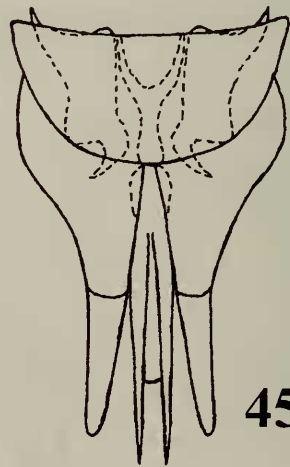
42

O. hispanus

43



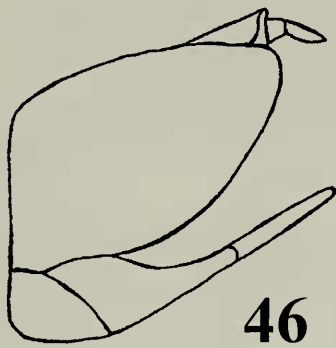
44



45

O. sagarus

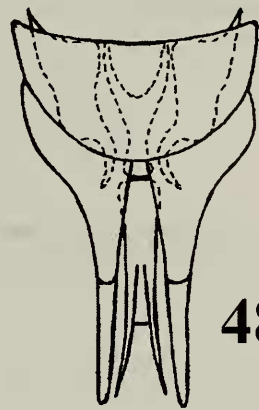
Figures 37-45. Male genitalia. Figs. 37-39. *Osbornellus (Nereius) venustus* n. sp. Figs. 40-42. *O. (N.) hispanus* n. sp. Figs. 43-45. *O. (N.) sagarus* n. sp. Figs. 37, 40, and 43, genital capsule, lateral view (setae not shown). Figs. 38, 41, and 44, aedeagus, lateral view. Figs. 39, 42, and 45, valve and subgenital plates, ventral view (also showing internal genitalia). All drawn to the same scale.



46



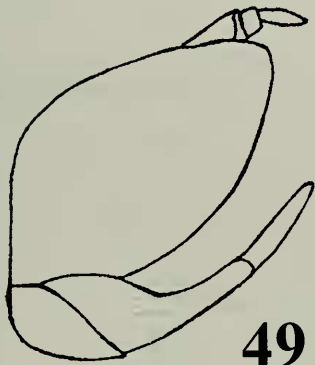
47



48

O. parvus

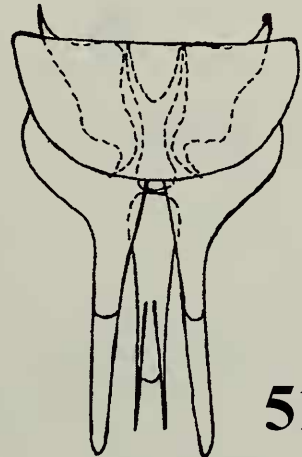
0.5 mm



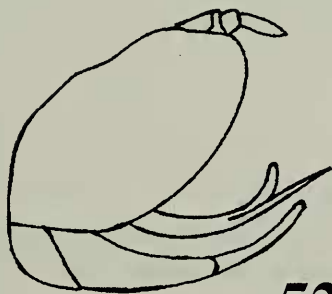
49



50



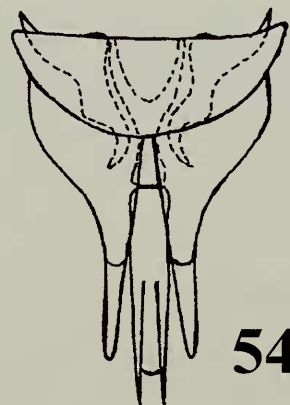
51

O. eratus

52



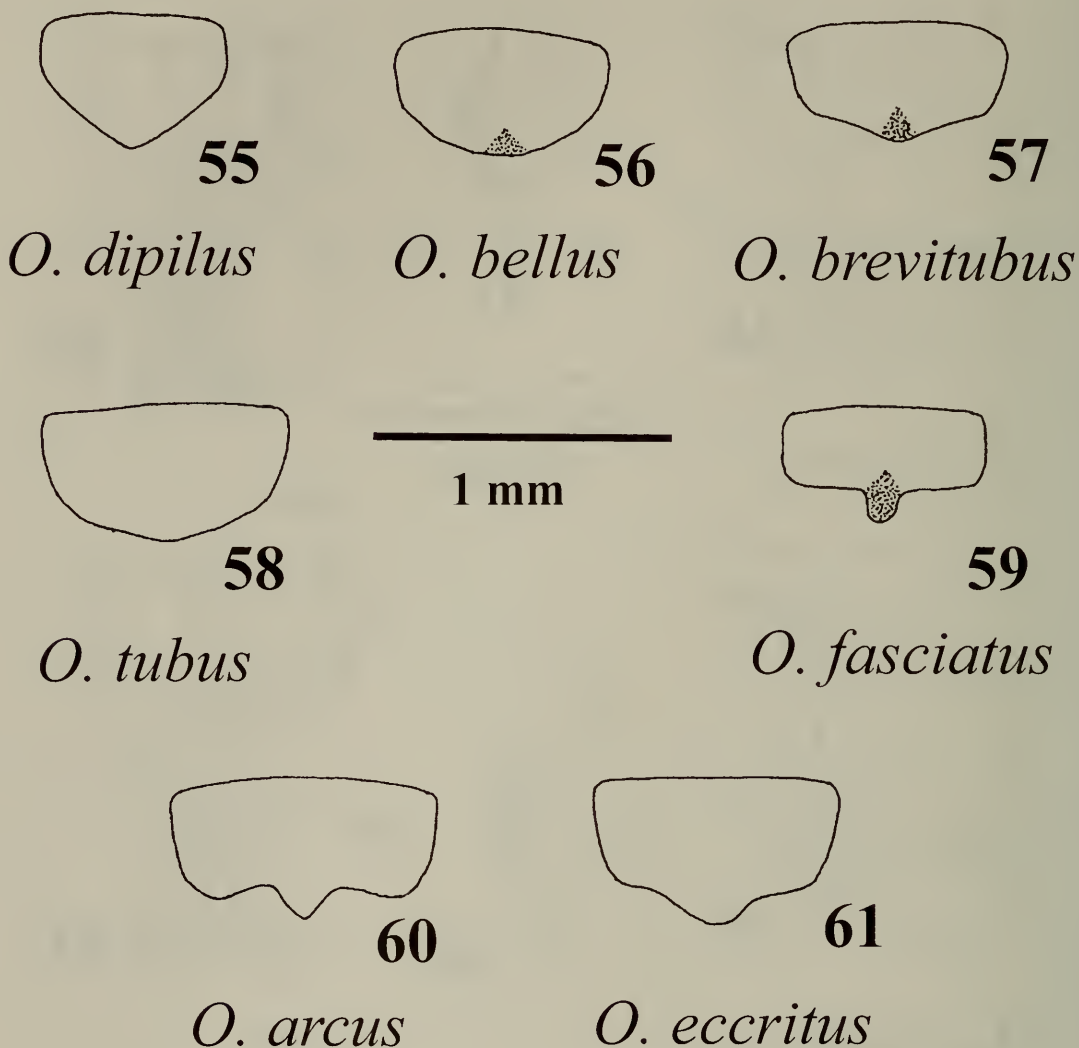
53



54

O. tetrus

Figures 46-54. Male genitalia. Figs. 46-48. *Osbornellus (Nereius) parvus* n. sp. Figs. 49-51. *O. (N.) eratus* n. sp. Figs. 52-54. *O. (N.) tetrus* n. sp. Figs. 46, 49, and 52, genital capsule, lateral view (setae not shown). Figs. 47, 50, and 53, aedeagus, lateral view. Figs. 48, 51, and 54, valve and subgenital plates, ventral view (also showing internal genitalia). All drawn to same scale.



Figures 55-61. Female seventh sternum, ventral view. Fig. 55. *Osbornellus (Nereius) dipilus* n. sp. Fig. 56. *O. (N.) bellus* n. sp. Fig. 57. *O. (N.) brevitubus* n. sp. Fig. 58. *O. (N.) tubus* n. sp. Fig. 59. *O. (N.) fasciatus* Metcalf. Fig. 60. *O. (N.) arcus* n. sp. Fig. 61. *O. (N.) eccritus* n. sp. All drawn to the same scale.

LITERATURE CITED

- Caldwell, J. S.** 1952. In, J. S. Caldwell and L. F. Martorell (Editors). Review of the Auchenorynchous Homoptera of Puerto Rico. Part I. Cicadellidae. The Journal of Agriculture of the University of Puerto Rico 34(1): 1-132.
- DeLong, D. M.** 1923. In, Wolcott, G. N. Insectae Portoricensis. A preliminary annotated check-list of the insects of Porto Rico, with descriptions of some new species. Journal of Agriculture of the University of Puerto Rico 7(1): 1-313.
- Linnavuori, R.** 1959. Revision of the Neotropical Deltocephalinae and some related subfamilies (Homoptera). Suomalaisen Elain-ja Kasvitieteelisen Seuran Vanamon Elaintieteelisia Julkaisuja 20: 1-370.
- Metcalf, Z. P.** 1954. Homoptera from the Bahama Islands. American Museum Novitates Number 1698, pp. 1-46.